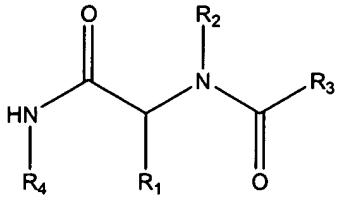
CLAIMS

What is claimed is:

1. A method of inhibiting tissue transplant rejection in a subject with a tissue transplant, said method comprising the step of administering an effective amount of a compound represented by Formula (I):



(I)

or a physiological salt thereof, wherein:

R_1 is a substituted or unsubstituted aryl group or a substituted or unsubstituted alkyl group;

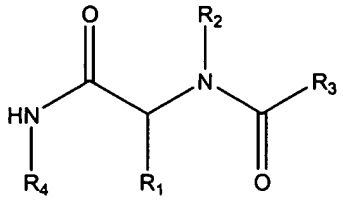
R_2 is an optionally substituted aralkyl group or an alkyl group substituted with $-NR_5R_6$;

R_3 is a substituted or unsubstituted alkyl group or a substituted or unsubstituted aryl group;

R_4 a substituted or unsubstituted alkyl group or a substituted or unsubstituted aryl group; and

R_5 and R_6 are independently selected from a substituted or unsubstituted alkyl group or a substituted or unsubstituted aryl group or R_5 and R_6 taken together with the nitrogen to which they are attached are a non-aromatic heterocyclic group.

2. A method of inhibiting chronic tissue transplant rejection in a subject with a tissue transplant, said method comprising the step of administering an effective amount of a compound represented by Formula (I):



(I)

or a physiological salt thereof, wherein:

R_1 is a substituted or unsubstituted aryl group or a substituted or unsubstituted alkyl group;

R_2 is an optionally substituted aralkyl group or an alkyl group substituted with $-NR_5R_6$;

R_3 is a substituted or unsubstituted alkyl group or a substituted or unsubstituted aryl group;

R_4 a substituted or unsubstituted alkyl group or a substituted or unsubstituted aryl group; and

R_5 and R_6 are independently selected from a substituted or unsubstituted alkyl group or a substituted or unsubstituted aryl group or R_5 and R_6 taken together with the nitrogen to which they are attached are a non-aromatic heterocyclic group.

3. The method of Claim 2 wherein R_2 is an optionally substituted heteroaralkyl group or an alkyl group substituted with $-NR_5R_6$.

4. The method of Claim 3 wherein R_4 is an optionally substituted aryl group, an optionally substituted cycloalkyl group, an optionally substituted C_1-C_4 aralkyl group or an optionally substituted C_1-C_4 cycloalkylalkyl group.

5. The method of Claim 4 wherein R_4 is an optionally substituted phenyl group, an optionally substituted phenyl-C_1-C_4-alkyl group, an optionally substituted diphenyl-C_1-C_4-alkyl group, an optionally substituted C_3-C_8-cycloalkyl-C_1-C_4-alkyl group or an optionally substituted di-(C_3-C_8-cycloalkyl)-C_1-C_4-alkyl group.

6. The method of Claim 5 wherein R_4 is an optionally substituted benzyl, an optionally substituted diphenylmethyl, an optionally substituted 2-phenylethyl, an optionally substituted 1,2-diphenylethyl, an optionally substituted 2,2-diphenylethyl or an optionally substituted 3,3-diphenylpropyl.

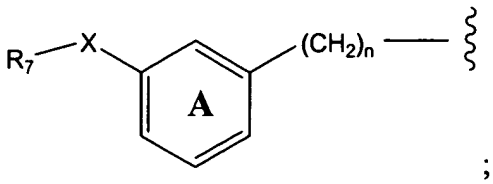
7. The method of Claim 3 wherein R_1 is an optionally substituted aryl group or an optionally substituted C_1-C_4 aralkyl group.

8. The method of Claim 7 wherein R_1 is an optionally substituted phenyl group or an optionally substituted phenyl-C_1-C_4 alkyl group.

9. The method of Claim 3 wherein R_3 is an optionally substituted aryl group or an optionally substituted C_1-C_4 aralkyl group.

10. The method of Claim 9 wherein R_3 is an optionally substituted phenyl, an optionally substituted phenyl-C_1-C_4-alkyl, an optionally substituted diphenyl-C_1-C_4-alkyl, an optionally substituted pyrazolyl, an optionally substituted pyrazolyl-C_1-C_4-alkyl, an optionally substituted indolyl, an optionally substituted indolyl-C_1-C_4-alkyl, thienylphenyl, thienylphenyl-C_1-C_4-alkyl, furanylphenyl, furanylphenyl-C_1-C_4-alkyl, an optionally substituted fluorenyl, an optionally substituted fluorenyl-C_1-C_4-alkyl, an optionally substituted naphthyl, an optionally substituted naphthyl-C_1-C_4-alkyl, an optionally substituted quinoxalinyl, an optionally substituted quinoxalinyl-C_1-C_4-alkyl, an optionally substituted quinazolinyl, an optionally substituted quinazolinyl-C_1-C_4-alkyl, an optionally substituted pyrolyl, an optionally substituted pyrolyl-C_1-C_4-alkyl, an optionally substituted thienyl, an optionally substituted thienyl-C_1-C_4-alkyl, an optionally substituted furanyl, an optionally substituted furanyl-C_1-C_4-alkyl, an optionally substituted pyridyl or an optionally substituted-C_1-C_4 pyridyl.

11. The method of Claim 10 wherein R_3 is represented by the following structural formula:



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wherein Ring **A** substituted or unsubstituted; R_7 is an optionally substituted phenyl, optionally substituted furanyl, optionally substituted thienyl or optionally substituted pyridyl group; n is an integer from 1-4; and X is a bond, CH_2, OCH_2, $CH_2OC(O)$, CO, OC(O), C(O)O, O, S, SO or SO_2.

12. The method of Claim 3 wherein R_3 is an optionally substituted an optionally substituted 2-cyclohexylethyl, an optionally substituted 2-cyclopentylethyl, or an optionally substituted C_3-C_8 secondary or tertiary alkyl group.

13. The method of Claim 3 wherein R_2 is an optionally substituted 2-(imidazol-4-yl)ethyl, an optionally substituted 3-(imidazol-4-yl)propyl, an optionally substituted 3-(imidazol-1-yl)propyl, an optionally substituted 2-(morpholin-4-yl)ethyl, an optionally substituted 2-(4-pyrazolyl)ethyl, an optionally substituted 2-*N,N*-dimethylaminoethyl or an optionally substituted 3-*N,N*-dimethylaminopropyl.

14. The method of Claim 3 wherein:

a) R_1 is an optionally substituted aryl group or an optionally substituted C_1-C_4 aralkyl group;

b) R_3 is an optionally substituted aryl group or an optionally substituted C_1-C_4 aralkyl group; and

c) R_4 is an optionally substituted aryl group, an optionally substituted cycloalkyl group, an optionally substituted C_1-C_4 aralkyl group or an optionally substituted C_1-C_4 cycloalkylalkyl group.

15. The method of Claim 3 wherein:

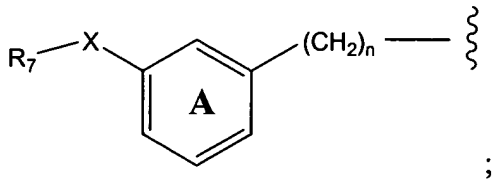
a) R_1 is an optionally substituted phenyl group or an optionally substituted phenyl-C_1-C_4 alkyl group;

b) R_3 a substituted or unsubstituted phenyl, phenyl-C_1-C_4-alkyl, diphenyl-C_1-C_4-alkyl, pyrazolyl, pyrazolyl-C_1-C_4-alkyl, indolyl, indolyl-C_1-C_4-alkyl, thienylphenyl, thienylphenyl-C_1-C_4-alkyl, furanylphenyl, furanylphenyl-C_1-C_4-alkyl, fluorenyl, fluorenyl-C_1-C_4-alkyl, naphthyl, naphthyl-C_1-C_4-alkyl, quinoxalinyl, quinoxalinyl-C_1-C_4-alkyl, an optionally substituted quinazolinyl, an optionally substituted quinazolinyl-C_1-C_4-alkyl, pyrolyl, pyrolyl-C_1-C_4-alkyl, thienyl, thienyl-C_1-C_4-alkyl, furanyl or furanyl-C_1-C_4-alkyl; and

c) R_4 is an optionally substituted phenyl group, an optionally substituted phenyl-C_1-C_4-alkyl group, an optionally substituted diphenyl-C_1-C_4-alkyl group, an optionally substituted C_3-C_8-cycloalkyl-C_1-C_4-alkyl group or an optionally substituted di-(C_3-C_8-cycloalkyl)-C_1-C_4-alkyl group.

16. The method of Claim 15 wherein R_2 is an optionally substituted imadazolyl-C_1-C_4-alkyl group or a C_1-C_4 alkyl group substituted with -NR_5R_6.

17. The method of Claim 16 wherein R_3 is represented by the following structural formula:



;

wherein Ring **A** substituted or unsubstituted; R_7 is an optionally substituted phenyl, furanyl, thienyl or pyridyl group; n is an integer from 1-4; and X is a bond, CH_2, OCH_2, $CH_2OC(O)$, CO, OC(O), C(O)O, O, S, SO or SO_2.

18. The method of Claim 17 wherein R_4 is 2,2-diphenylethyl, 2-phenylethyl, benzyl, diphenylmethyl, 1,2-diphenylethyl, 3,3-diphenylpropyl, benzyl, or 2-pyridylethyl, each optionally substituted with -OH, halogen, R, -CH_2R, -OCH_2R, -$CH_2OC(O)R$, -OR, -O-COR, -COR, -CN, -NO_2, -COOH, -SO_3H, -NH_2, -NHR, -$N(R)_2$, -COOR, -CHO, -$CONH_2$, -CONHR, -$CON(R)_2$, -NHCOR, -NRCOR, -$NHCONH_2$, -NHCONRH, -$NHCON(R)_2$, -$NRCONH_2$, -NRCONRH, -$NRCON(R)_2$, -C(=NH)-NH_2, -C(=NH)-NHR, -C(=NH)-$N(R)_2$, -C(=NR)-NH_2, -C(=NR)-NHR, -C(=NR)-$N(R)_2$, -NH-C(=NH)-NH_2, -NH-C(=NH)-NHR, -NH-C(=NH)-$N(R)_2$, -NH-C(=NR)-NH_2, -NH-C(=NR)-NHR, -NH-C(=NR)-$N(R)_2$, -NRH-C(=NH)-NH_2, -NR-C(=NH)-NHR, -NR-C(=NH)-$N(R)_2$, -NR-C(=NR)-NH_2, -NR-C(=NR)-NHR, -NR-C(=NR)-$N(R)_2$, -SO_2NH_2, -SO_2NHR, -$SO_2N(R)_2$, -SH or -SO_kR;

each R is independently C_1-C_4 alkyl or phenyl optionally substituted with amino, alkylamino, dialkylamino, aminocarbonyl, halogen, alkyl, alkylaminocarbonyl, dialkylaminocarbonyloxy, alkoxy, nitro, cyano, carboxy, alkoxycarbonyl, alkylcarbonyl, hydroxy, haloalkoxy, or haloalkyl; and

k is zero, one or two.

19. The method of Claim 18 wherein R_1 is a phenyl group or phenyl-C_1-C_4 alkyl group each optionally substituted with R, -CH_2R, -OCH_2R, -$CH_2OC(O)R$, -OH, halogen, -OR, -O-COR, -COR, -CN, -NO_2, -COOH, -SO_3H, -NH_2, -NHR, -$N(R)_2$, -COOR, -CHO, -$CONH_2$, -CONHR, -$CON(R)_2$, -NHCOR, -NRCOR, -$NHCONH_2$, -NHCONRH, -$NHCON(R)_2$, -$NRCONH_2$, -NRCONRH, -$NRCON(R)_2$, -C(=NH)-NH_2, -C(=NH)-NHR, -C(=NH)-$N(R)_2$, -C(=NR)-NH_2, -C(=NR)-NHR, -C(=NR)-$N(R)_2$, -NH-C(=NH)-NH_2, -NH-C(=NH)-NHR, -NH-C(=NH)-$N(R)_2$, -NH-C(=NR)-NH_2, -NH-C(=NR)-NHR, -NH-C(=NR)-$N(R)_2$, -NRH-C(=NH)-NH_2, -NR-C(=NH)-NHR, -NR-C(=NH)-$N(R)_2$, -NR-C(=NR)-NH_2, -NR-C(=NR)-NHR, -NR-C(=NR)-$N(R)_2$, -SO_2NH_2, -SO_2NHR, -$SO_2N(R)_2$, -SH or -SO_kR.

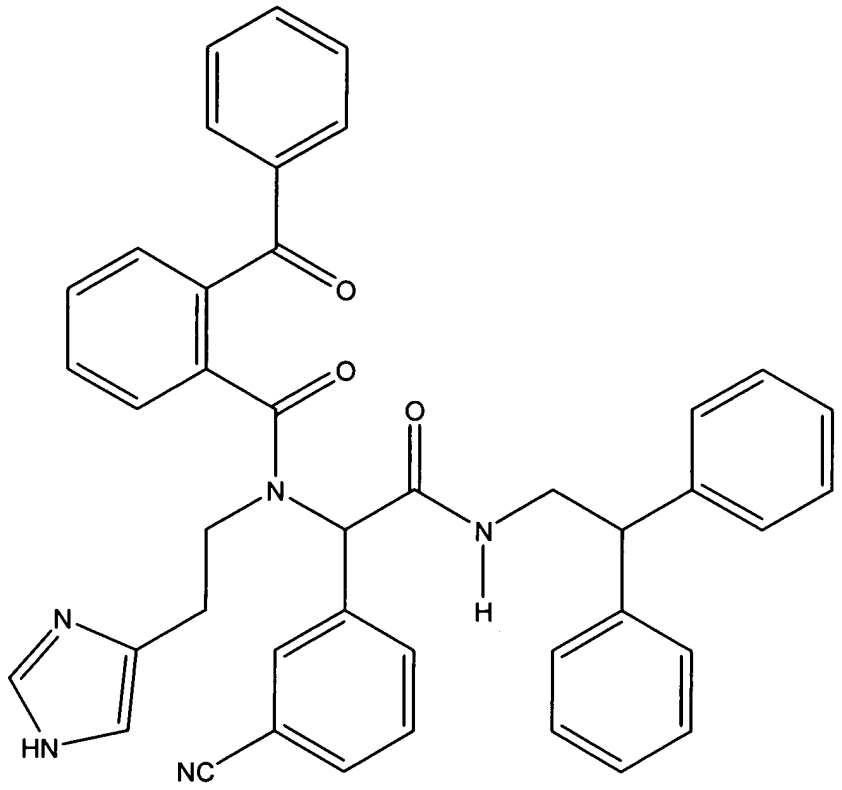
20. The method of Claim 19 wherein R_1 is a phenyl group or phenyl-C_1-C_2 alkyl group, each optionally substituted with C_1-C_4 alkyl, C_1-C_4 alkoxy, halogen, CN, C_1-C_4-alkylthiol, C_1-C_4-haloalkyl or phenoxy; R_4 is 2,2-diphenylethyl, 2-phenylethyl, benzyl, diphenylmethyl, 1,2-diphenylethyl, 3,3-diphenylpropyl, benzyl, or 2-pyridylethyl, each optionally substituted with C_1-C_4 alkyl, C_1-C_4 alkoxy, halogen, CN, C_1-C_4-alkylthiol, C_1-C_4-haloalkyl or phenoxy; R_7 is an optionally substituted phenyl group; n is 1; and X is CO.

21. The method of Claim 20 wherein Ring **A** is unsubstituted and R_7 is a phenyl group optionally substituted with R, $-CH_2R$, $-OCH_2R$, $-CH_2OC(O)R$, -OH, halogen, -OR, -O-COR, -COR, -CN, $-NO_2$, -COOH, $-SO_3H$, $-NH_2$, -NHR, $-N(R)_2$, -COOR, -CHO, $-CONH_2$, -CONHR, $-CON(R)_2$, -NHCOR, -NRCOR, $-NHCONH_2$, -NHCONRH, $-NHCON(R)_2$, $-NRCONH_2$, -NRCONRH, $-NRCON(R)_2$, $-C(=NH)-NH_2$, -C(=NH)-NHR, $-C(=NH)-N(R)_2$, $-C(=NR)-NH_2$, -C(=NR)-NHR, $-C(=NR)-N(R)_2$, $-NH-C(=NH)-NH_2$, -NH-C(=NH)-NHR, $-NH-C(=NH)-N(R)_2$, $-NH-C(=NR)-NH_2$, -NH-C(=NR)-NHR, -NH-C(=NR)-$N(R)_2$, $-NRH-C(=NH)-NH_2$, -NR-C(=NH)-NHR, -NR-C(=NH)-$N(R)_2$, -NR-C(=NR)-NH_2, -NR-C(=NR)-NHR, -NR-C(=NR)-$N(R)_2$, $-SO_2NH_2$, $-SO_2NHR$, $-SO_2N(R)_2$, -SH or $-SO_kR$.

22. The method of Claim 21 wherein R_7 is a phenyl group.

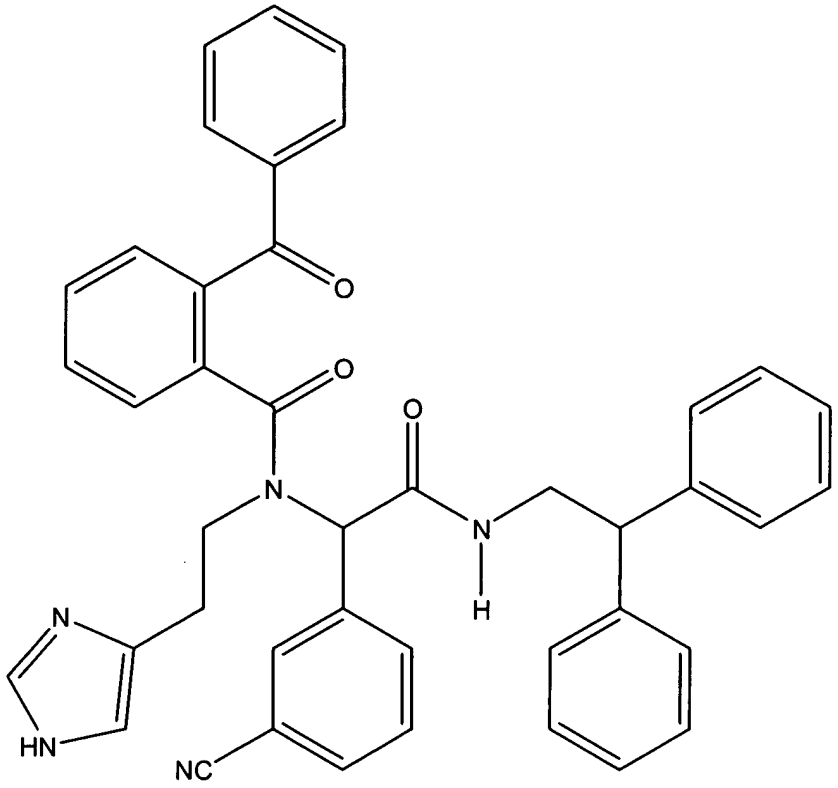
23. The method of Claim 22 wherein R_2 is 2-(imidazol-4-yl)ethyl.

24. A method of inhibiting tissue transplant rejection in a subject with a tissue transplant, said method comprising the step of administering an effective amount of a compound represented by the following structural formula:



or a pharmaceutically acceptable salt thereof.

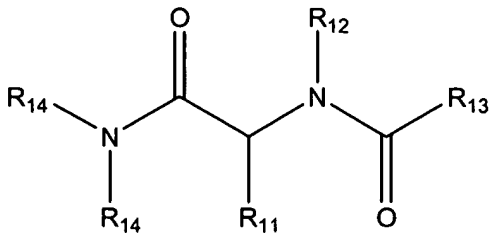
25. A method of inhibiting chronic tissue transplant rejection in a subject with a tissue transplant, said method comprising the step of administering an effective amount of a compound represented by the following structural formula:



(II).

or a pharmaceutically acceptable salt thereof.

26. A method of inhibiting tissue transplant rejection in a subject with a tissue transplant, said method comprising the step of administering an effective amount of a compound represented by the following structural formula:



or a physiologically acceptable salt thereof, wherein:

R_{11} is -H, a substituted or unsubstituted aryl, a substituted or unsubstituted aralkyl, a substituted or unsubstituted heteroaryl or a substituted or unsubstituted heteroaralkyl;

R_{12} is alkyl substituted with $NR_{15}R_{16}$, a substituted or unsubstituted aryl, a substituted or unsubstituted heteroaralkyl, or a substituted or unsubstituted heterocycloalkylalkyl;

R_{13} is a substituted or unsubstituted alkyl, a substituted or unsubstituted aryl, a substituted or unsubstituted aralkyl, a substituted or unsubstituted cycloalkylalkyl, a substituted or unsubstituted heteroaryl, a substituted or unsubstituted heteroaralkyl, a substituted or unsubstituted benzophenonyl, or a substituted or unsubstituted cycloalkylalkyl; and

each R_{14} is independently, -H, a substituted or unsubstituted alkyl, a substituted or unsubstituted aryl, substituted or unsubstituted aralkyl or a substituted or unsubstituted heteroaralkyl;

R_{15} and R_{16} are independently selected from H, a substituted or unsubstituted alkyl, a substituted or unsubstituted cycloalkyl, a substituted or unsubstituted aryl or unsubstituted aralkyl or R_{13} and R_{14} together with the nitrogen to which they are attached are a heterocycloalkyl.